Vascularized Nasoseptal Flap for Medial Orbital Wall Reconstruction

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Abstract: With the use and efficacy of the vascularized nasoseptal flap, its indications are also expanding. Due to its relative ease of harvesting and no significant impairment in the long-term sinonasal quality of life, the flap has been used for a number of other purposes apart from its originally proposed use in reconstruction of the anterior cranial fossa, sella, and the clivus. Its use may negate the need of another incision to obtain fat or fascia. The authors describe the case of a 47-year-old lady who underwent endoscopic excision of a medially placed orbital intraconal hemangioma who presented to us with very poor vision in the left eye. The large medial orbital defect was reconstructed with a vascularized pedicled nasoseptal flap from the ipsilateral side. The patient made an excellent visual and sino-nasal recovery. This patient highlights a unique use for the proliferating indications for the use of the nasoseptal flap.

Key Words: Endoscopy, hemangioma, nasoseptal flap, orbital reconstruction

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The nasoseptal flap is a robust, vascularized flap used in endoscopic sinus surgery, primarily developed and used to reconstruct the skull base.1 Over the years, as surgeons have become more experienced and comfortable, endoscopic approaches have evolved to allow the removal of a variety of lesions in different regions of the skull base. Recently, otolaryngologists, neurosurgeons, and ophthalmologists have begun using the endoscopic approach to address orbital lesions. While controversy exists whether endoscopic approaches for medial orbital lesions warrant reconstruction, when significant orbital fat and extraocular muscle exposure occurs, reconstruction should be considered. While a cadaveric study and a single report has mentioned the use of the naso-septal flap for this purpose,2,3 we further describe the technical nuances of using the nasoseptal flap for medial orbital wall reconstruction following the endoscopic excision of intraconal tumors.

The final pathology confirmed the diagnosis of hemangioma. The patient had an unremarkable postoperative course and was discharged on the second postoperative day. Visual acuity was rechecked at 6 weeks postoperatively and had remarkably improved to 20/40 in the left eye. Endoscopic examination demonstrated a well-healed nasal cavity with good mucolization of both flaps and a well-reconstituted medial orbital wall. A postoperative magnetic resonance imaging showed no residual lesion and good reconstruction of the orbit (Fig. 3).

Postoperative Course

A 47-year-old woman presented with a 1-year history of progressive diminution of vision in her left eye. She did not report any sinonasal symptoms. Her visual acuity was 20/20 in the right eye and 20/400 in the left eye. She had narrowing of her visual field in the left eye, in both the temporal and nasal quadrant. Fundoscopic examination showed left optic nerve atrophy. The remainder of the neurological examination was normal. A magnetic resonance imaging demonstrated a 2-cm globular, left intraconal lesion between the optic nerve and the medial rectus muscle, displacing the nerve laterally. It extended from the orbital apex posteriorly to the mid-orbital region. It was partially hypointense on T1-weighted images and hyperintense on T2W images. Based on the radiographic appearance a provisional diagnosis of a hemangioma was made (Fig. 1). Various open surgical approaches were discussed but it was felt that an endoscopic approach was feasible and less invasive and the patient was consented for an endoscopic transorbital excision of the mass.

Surgery

A retrograde uncinectomy and endoscopic medial maxillectomy were performed followed by a complete anterior and posterior ethmoidectomy to the level of the orbital apex and skull base. A large sphenoidotomy was then performed. The middle turbinate was resected to facilitate exposure. A 6-cm vascularized nasoseptal flap was harvested based on the posterior septal artery and mobilized into the nasopharynx (Fig. 2). This was then followed by a posterior septectomy. The lamina papyracea was thinned with a high-speed diamond burr, and then carefully fractured. It was then elevated off the peri-orbita with a Cottle elevator. Using a knife the peri-orbita was carefully incised and elevated, exposing the orbital fat. By dissecting down through the fat, the medial rectus muscle and superior oblique were exposed inferiorly and superiorly respectively. Using microsurgical technique the tumor was then carefully removed enbloc between the muscles (Fig. 2).

After tumor removal, the nasoseptal flap was rotated superiorly to cover the entire area of exposed orbital fat and peri-orbita. It extended from the skull base superiorly to the orbital floor and as far anteriorly as the nasolacrimal duct. Surgicel and tissue adhesive were then placed over the edges of flap and bone to help secure it in place. A contralateral mucosal flap was used to line the vomer.
DISCUSSION

The nasoseptal flap, originally described by Hadad and Bassagasteeguy, has revolutionized outcomes in skull base surgery and significantly reduced complication rates.\(^1\) In particular, it has significantly reduced the rate of postoperative cerebrospinal leak.\(^4,5\) The flaps’ primary use has traditionally been to reconstruct the anterior cranial fossa, sella, and the clivus, separating the cranial cavity from the sinonasal tract. It has been shown that there is no significant long-term impairment in the sinonasal quality of life after harvesting of this flap for various pathologies.\(^6\) Owing to its versatility, some authors have described its innovative use in treating recurrent craniopharyngiomas creating an external fistula for cyst drainage into the postnasal space while others have reported its use for pathological oro-antral fistula closure.\(^7,8\) We present a patient of the use of the naso-septal in orbital wall reconstruction after the endoscopic removal of a medial intraconal orbital lesion.

With the advent of orbital tumors being excised endoscopically, Chaabra et al\(^2\) performed a cadaver study to describe the use of the nasoseptal flap for reconstruction of the orbit. The mean orbital defect was 4.5 to 5 cm anteroposteriorly and 0.9 to 1.7 cm in height. They reported successfully designed flaps that measured a mean width of 55 ± 6.16 mm, height of 48 ± 4.47 mm, and depth of 70 ± 3.54 mm; large enough to cover a medial and inferior orbital defect. The authors emphasized that it was necessary to carry the lateral incision to the level of the inferior meatus to ensure that the distal aspect of the flap was wide enough to cover the defect. When a septectomy is performed, an ipsilateral or contralateral nasoseptal flap can be used to reconstruct the defect. Healy et al\(^3\) have described a contralateral flap to reconstruct the orbital defects, proposing that this facilitates a 4 handed-binasal technique. In our patient, we were able to perform the same reconstruction without difficulty with the use of a unilateral flap. There was no torsion or kinking of the pedicle and a contralateral mucosal flap was used to line the vomer.

The endoscopic technique of reconstruction using this flap, which can be easily harvested within the surgical field, provides the advantage of its vascularized nature and easy placement over the periorbita. The flap acts as a buttress being of the correct consistency to keep the orbital contents in place, is expandable without the risk of any additional pressure within the intraconal cavity. Theoretically, it should reduce postoperative crusting as it would...
reduce the amount of remucosalization that needs to take place. It can be contoured along the medial orbital wall and avoids complications associated with rigid reconstruction. Since most experienced endoscopic surgeons are familiar with its use, there is no additional learning curve for this application. With this study we add to the expanding literature demonstrating the efficacy of the nasoseptal flap after endoscopic excision of orbital lesions.

REFERENCES